

MATH 225
Linear Algebra and Differential Equations
2019-2020 Spring
Project 3

DUE DATE: May 5, Tuesday before 23:55 p.m.

QUESTIONS:

1) In each of the following, decide if the Existence and Uniqueness Theorem is applicable. Find, if exists, the solution(s) for each of items.

(a)(15 pts.) $y' = 5y^{4/5}$, $y(0) = 0$.

(b)(15 pts.) $y' = 5y^{4/5}$, $y(0) = 1$.

2) (a)(10 pts.) Find the continuous solution to the initial value problem

$\frac{dy}{dx} + y = q(x)$ where $q(x) = \begin{cases} 1 & \text{if } |x| \leq 1 \\ 0 & \text{if } |x| > 1 \end{cases}$ satisfying $y(0) = 0$.

(b)(10 pts.) Solve the differential equation $\frac{dy}{dx} = \frac{x+3y}{x-y}$

3) Let $(3xy - y^2)dx + x(x - y)dy = 0$ be given.

(a)(5 pts.) Show that the given equation is not exact.

(a)(15 pts.) Find an integrating factor which makes the given equation exact and solve it as an exact differential equation.

IMPORTANT:

1. Don't forget to write your Name, Lastname, Department, Section and Student ID on the 1st page of your project.

2. You must show all your work in well-organized English or mathematical sentences, and explain your reasoning carefully.

3. Your project must be hand written. The projects written by latex or word etc. will not be accepted.

4. You must submit your project as a 1 pdf file. Before submission check the file you convert to pdf. If you cannot read it, try to do the best. The name of the pdf file must contain your name. e.g. **yosum.project3.pdf** would be the name of my project.

5. You must **SUBMIT** your project. The **DRAFTS** will not be accepted because **DRAFT** means **INCOMPLETE**. You are **responsible** to complete the submission process. It is not our job.

6. Late submissions will not be accepted